

The first step to solving all limit problems is to plug in the x-value first. If that yields a real number, then that is your answer. That is all you have to do on problems 1-34 (other than #2b)

1. a) 0 b) -5
 2. a) 2.4 b) Plugging a 9 in results in an error, you must use the conjugate.

$$\frac{12(\sqrt{x}-3)}{x-9} \cdot \frac{12(\sqrt{x}+3)}{12(\sqrt{x}+3)} = \frac{144(x-9)}{(x-9)12(\sqrt{x}+3)} = \frac{12}{(\sqrt{x}+3)}, \text{ then plug 9 in}$$

Answer: 2

5. 8 6. 81
 7. -1 8. -5
 9. 0 10. -7
 11. 7 12. 1
 17. 0.5 18. -2.5
 27. 1 28. 0
 29. 0.5 30. 0
 31. 1 32. -1
 33. 0.5 34. 0.5

41. $\frac{x(x+3)}{x} = x+3 = 3$

42. $\frac{x^2(x^2-5)}{x^2} = x^2-5 = -5$

43. $\frac{(x-1)(x+1)}{x+1} = x-1 = -2$

44. $\frac{(3x-1)(x+2)}{x+2} = 3x-1 = -7$

48. $\frac{2x}{x(x+4)} = \frac{2}{x+4} = 0.5$

49. $\frac{x-4}{(x-4)(x+4)} = \frac{1}{x+4} = \frac{1}{8} \text{ or } 0.125$

50. $\frac{5-x}{(x+5)(x-5)} = \frac{-(x-5)}{(x+5)(x-5)} = \frac{-1}{x+5} = -0.1$

51. $\frac{(x+3)(x-2)}{(x+3)(x-3)} = \frac{(x-2)}{(x-3)} = \frac{-5}{-6} = \frac{5}{6}$

52. $\frac{(x+4)(x-2)}{(x+1)(x-2)} = \frac{(x+4)}{(x+1)} = 2$

55. $\frac{\sqrt{x+5}-\sqrt{5}}{x} \cdot \frac{\sqrt{x+5}+\sqrt{5}}{\sqrt{x+5}+\sqrt{5}} = \frac{x+5-5}{x(\sqrt{x+5}+\sqrt{5})} = \frac{1}{\sqrt{x+5}+\sqrt{5}} = \frac{1}{2\sqrt{5}}$

56. $\frac{\sqrt{2+x}-\sqrt{2}}{x} \cdot \frac{\sqrt{2+x}+\sqrt{2}}{\sqrt{2+x}+\sqrt{2}} = \frac{2+x-2}{x(\sqrt{2+x}+\sqrt{2})} = \frac{1}{\sqrt{2+x}+\sqrt{2}} = \frac{1}{2\sqrt{2}}$

57. $\frac{\frac{1}{3+x} - \frac{1}{3}}{x} = \frac{\frac{3}{3(3+x)} - \frac{3+x}{3(3+x)}}{x} = \frac{\frac{-x}{3(3+x)}}{x} = \frac{-1}{3(3+x)} = -\frac{1}{9}$

58. $\frac{\frac{1}{x+4} - \frac{1}{4}}{x} = \frac{\frac{4}{4(x+4)} - \frac{x+4}{4(x+4)}}{x} = \frac{\frac{-x}{4(x+4)}}{x} = \frac{-1}{4(x+4)} = -\frac{1}{16}$